SGI environmental THE SOURCE GROUP, INC.

July 15, 2008

Mr. Nasser Sionit
County of San Diego
Department of Environmental Health
P.O. Box 129261
San Diego, CA 92112-9261

Subject: **Carlsbad Energy Center Project -**
**Fuel Oil Storage Tank Removal and**
**Verification Sampling Work Plan**
**Encina Power Station, Carlsbad, California**
**Voluntary Assistance Program Case Number H13941-004**

Dear Mr. Sionit:

On behalf of Carlsbad Energy Center LLC (the Applicant), The Source Group, Inc. (SGI) submits this work plan for fuel oil storage tank soil verification sampling associated with the removal of surplus above ground storage tanks at the Encina Power Station in Carlsbad, California (Figure 1). Carlsbad Energy Center LLC is currently permitting the Carlsbad Energy Center Project (CECP) which will entail the demolition of existing surplus fuel oil Tanks 5, 6, and 7, and the associated conveyance piping and foundations in the tank farm. The area currently occupied by these tanks is the proposed location of new power generation equipment; an Application for Certification for development and construction of a new power plant in this area is under review with the California Energy Commission (Docket 07-AFC-6).

The CECP is currently enrolled under the Voluntary Assistance Program (VAP), case number H13941-004, administered by the San Diego County Department of Environmental Health (SDCDEH) to assist with the review and consurance of work plans and provide final closure letters for environmental cleanups in the tank farm. The objective of this work plan is to (1) briefly describe general procedures for removal of tank bottoms, piping and associated foundations, and underlying contaminated soil (where applicable); and (2) define the verification soil sampling protocols to be implemented following removal of contaminated soil. This work plan provides suggested cleanup goals consistent with the San Deigo Site Assessment and Mitigation (SAM) manual for petroleum hydrocarbons impacted sites. The removal of Tanks 5, 6, and 7 are described in a separate work plan that will be submitted to the San Diego County Hazardous Materials Management Division and the California Energy Commission for review and approval.

**Site Background**

The proposed location of the CECP is in Tank 5, 6, and 7 basins at the Encina Power Station. The Encina Power Station is a steam electric power generating station which began operations in 1954. The station consists of five steam turbine generators and one gas turbine unit, various ancillary

power generation and distribution equipment including seven above ground fuel oil storage tanks (Figure 2).

### Source of Contaminants

The primary contaminant of concern is No. 2 fuel oil which was used in the construction of the above ground tanks. Tank design drawings provided by CECP depict the tanks constructed on top of a six-inch thick, oil-impregnated sand cushion which is surrounded by a concrete perimeter ring wall foudation. The oil-impregnated sand cushion is comprised of No. 2 fuel oil (middle distillate carbon range C9-C20) thoroughly mixed with sand at a rate of 22 gallons of No. 2 fuel oil per cubic yard of sand. The secondary sources of contaminants in soil in the tank farm area are from residual fuel oil No. 6 (heavy fuel oil) from previous cleanups of releases during the operation of the tank farm. The residual fuel oil No. 6 is present in areas not accessible during previous cleanups due to tank or ancillary equipment foundations. The prior removal of accessible soil contaminated with fuel oil No. 6 and the characterization of residual fuel oil No. 6 in soil in inaccessible areas (primarily in tank 7 basin) is well documented in closure reports reviewed and approved by SDDEH (VAP Case No. H13941-003).

### Demolition and Removal of Tanks Bottoms

The methods described herein are general in nature, and may be revised as the work progresses. Tanks 5, 6, and 7 will be isolated from the respective utilities/pipelines and inspected by a Marine Chemist or a Certified Industrial Hygienist to ensure that hazardous material has been removed from the tanks. A demolition contractor will then remove above grade structures leaving in place foundations and tank bottoms within the respective tank basins. The tank bottoms will be removed immediately prior to soil excavation activities in order to avoid any unnecessary storm water infiltration or erosion.

Any accumulated rainwater in the tank basins will be pumped out for subsequent proper disposal. The steel tank bottoms will be cut into sections and removed for recycling. No open flames will be used to remove the tank bottoms. Excavators and loaders will load demolition debris into dump trucks for off-site transportation and disposal to a local permitted landfill in accordance with California regulations. The tank floors will be removed in sections, leaving the tank ring walls in place until contaminated soil is removed and verification samples have been collected.

### Remedial Methods

Soil removal was selected as the best remedial method due to the relatively thin layer of TPH impacted soil, limited site area, and future planned grading activities for site restoration efforts. The six-inch thick sand cushion will be removed by remedial excavation from the footprint of each tank. For estimation purposes the removal quantities include an additional six-inch of soil below the sand cushion. The approximate volumes that will be generated by removal of the initial one-foot of material are as shown in Table 1. Soil contaminated soil with TPH will be removed using excavation and off-site disposal at a pre-approved State licsenced facility.

Restoration will involve backfill of excavation with on site soil, grading, and soil amendments prescribed by the construction Storm Water Pollution Prevention Plan (SWPPP). Restoration efforts will governed by grading plans to be approved by the California Energy Commission.

After initial soil removals from exposed tank bottom are completed to planned depth field observations and a photo-ionization detector (PID) will be used to guide any additional remedial excavation/removal activities. The PID will be used to screen the soil for the presence of volatile organic constituents of petroleum hydrocarbons as an indicator of petroleum hydrocarbons present in remaining soil. The threshold for considering soil contaminated will be PID readings of 100 part per million (ppm). If visual or olfactory observations or PID reading indicate impacted soil are present beyond the original boundary of the remedial excavation/removal action, remedial excavation in that area will be advanced until the exaction reaches a limit at which evacuation will require inspection by a civil engineer or competent person. No excavation in the tank bottoms will be advanced deeper that the bottom of the ring wall foundations without having prior approval by a civil engineer or competent person.

Since the initial excavation depth for each tank footprint is anticipated at only one-foot, sloping or benching will not be necessary. Remediation along pipeline corridors will be based visual and field PID readings.

### Soil Cleanup Goals

The proposed cleanup goals for No. 2 fuel oil range organics and fuel oil No 6 are based on SAM Manual guidance per Section 6. Table 2 shows the proposed remedial goals for TPH (only) based on the calculated petroleum-specific residual NAPL saturation values for specific soil types. The residual saturation values are calculated based on specific soil type hydraulic conductivity and the characteristics and mass of different type of petroleum hydrocarbons. The equations used to calculate the residual saturation in soils assign conservative values for saturated soil hydraulic conductivities, soil properties, and petroleum properties to provide the lowest expected residual saturation for a particular fuel and soil type.

Proposed cleanup goals for BTEX, naphthalene, and polynuclear aromatics (PNAs) in soil are presented in Table 3. The proposed cleanup goals for these constituents are based on a direct conversion from the interim cleanup goals presented in the San Diego Regional Water Quality Control Board's (SDRWQCB) 1996 memorandum on low-risk fuel contaminated sites. The goals are taken from "Table 1" of the memorandum which was intended for sites within 1,000-feet of marine surface waters, and was intended to be applied directly to groundwater, however, these values are proposed for this project and ignore natural attenuation factors. This is a conservative approach that should provide a remedial solution that is protective of human health and the environment.

The SDRWQCB defined low-risk sites as where sources have been stopped and/or remediated to extent practicable, the site has been adequately characterized, no current groundwater contamination exists, no groundwater surface water or sensitive receptor is likely to be impacted, no significant risk to human health is present, and the site is not a significant risk to the environment. Under the current conditions the subject tanks meets the criteria for a low-risk site.

### Verification Sampling

After removal of the initial foot of soil beneath each tank footprint by remedial excavation, soil samples will be collected from the excavation using conventional sampling equipment. Soil samples will be collected as discrete grab samples and will be taken from the bottom of each excavation. Verification samples will be logged into chain-of-custody forms and submitted to an off-site analytical laboratory for appropriate analysis. Analytical results will be compared to a proposed

cleanup level for TPH, and the most recent version of the industrial Region 9 EPA Preliminary Remediation Goals (PRGs) for polynuclear aromatic hydrocarbons (PAHs).

Bottom samples will be collected from the base of each completed excavation at a frequency of one every 10,000 square feet, which approximates a 100-foot by 100-foot square grid. Figure 2 depicts the proposed 100-foot sample grids over the footprints of Tanks 1, 3, 5, 6, and 7. Soil samples will be collected from the approximate center of each sampling grid or, if suspected contamination is present, samples will be biased toward visual staining, odor, and/or PID readings of soil. The initial excavations are anticipated to be 1 foot in depth inside the tank ring wall, as such, no sidewall samples will be collected until the ring walls are removed. If the final excavation is greater than 4 feet in depth, however, sidewall soil samples will also be collected at a minimum frequency of one per 100 linear feet of sidewall. Soil samples will be collected from the approximate midpoint of the sidewall or samples will be biased toward visual staining, odor, and PID readings of soil.

All samples will be submitted to an off-site, State-certified analytical laboratory for the following analyses:

- TPH-Extractable (diesel and No.6 fuel oil) by EPA Method 8015B, and
- One soil sample from each tank with the highest TPH concentration will also be analyzed for PAHs by EPA Method 8270C Selective Ion Monitoring (SIM).

If the remedial post-excavation sampling analyses indicate concentrations of TPH are above the cleanup level of 1,000 ppm or PNA concentrations are over the SDDEH recommended cleanup goals, then additional remedial excavation will be advanced as practicable and additional verification soil samples would be collected and appropriately analyzed with the written approval of CECP, and SDDEH.

Remedial excavations will be terminated when there is no longer visible or olfactory observations or PID field screening evidence of petroleum hydrocarbons present in the soil. Verification soil samples will be collected from the bottom and sidewalls of all over excavation areas.

**Waste Management**

The primary waste streams and the amounts of each to be generated during the implementation of the removal action include:

- No.2 fuel oil impacted cushion sand and soil excavated from beneath the three tanks 8552 cubic yards from the initial one-foot remedial excavations;
- Equipment decontamination wastewater – amount not determined at this time;

Waste streams that will be recycled or disposed of off-site will be characterized and disposed of as required by federal RCRA and state hazardous and non-hazardous waste regulations. Any containers, such as roll-off bins, poly-tanks, or 55-gallon drums, used to store waste materials on site will be clearly labeled to indicate specific source, type of material, date of characterization, project contact and telephone number and remediation contractor project number.

Segregation of wastes will be based on field screen and analytical results. Storage, transportation, and disposal of all wastes will comply with the federal (such as the Department of Transportation), state, and local county regulations and requirements. All waste disposals will be coordinated through the remediation contractor, however, an CECP representative will sign all waste disposal manifests or bills-of-lading as generator.

### Stockpiles

Contaminated soil will be excavated directly into trucks for immediate off site disposal or recycling at appropriately permitted facilities. It is not anticipated that impacted soils will be stockpiled on site. However, in the event that impact soil is stockpiled or exposed the remediation contractor will follow the SAM Manual Section 7, VI and Section 5, XI will be employed for the management of petroleum hydrocarbons soil. and all applicable Best Management Practices mandated by the Site Grading Plans –Erosion Control Plan and the Construction Storm Water Pollution Prevention Plan. Per the SAM Manual guidance stockpiled impacted soil will be:

- Place on a relatively impervious surface such as covered asphalt, concrete, or plastic sheeting.
- Moisten to minimize dust emissions during stockpiling (no runoff is to be created during this process).
- Construct and maintain the stockpile in a manner that prevents surface and rainwater from entering the stockpile and minimizes vapor emissions.
- Secure covering with heavy plastic sheeting to minimize vapor emissions and prevent runoff from rain (sheeting must be maintained in good condition).
- Stockpiled soil will be removed within 90 days of excavation.

### Waste Profiling

As appropriate, the respective waste streams will be pre-characterized through the collection and analysis of waste characterization samples. Tank bottom characterization samples will be collected at the first opportunity after the above grade tank structures have been removed. Following receipt of the analytical results, from a state-certified analytical laboratory, the wastes will be categorized and profiled for disposal under a manifest or bill-of-lading prepared by the remediation contractor and signed by an CECP representative. All wastes will be profiled according to California Code of Regulations, Title 22, Division 4.5, Chapters 10 through 32, and federal RCRA regulations. Stockpile sampling will be based on the stockpile size and will follow EPA Guidance SW-846 per the SAM Manuel.

The PPE and contaminated general site waste will be profiled as such, and will be disposed of as a non-hazardous solid waste.

### Disposal

Following characterization and profiling, the respective waste streams will be manifested for off-site disposal or recycling, as appropriate. All disposals of wastes, or recycling of such wastes, will occur only at approved State Licensed facilities. Only CECP pre-approved disposal facilities will be utilized for the duration of the project. It is anticipated that contaminated soil will be transported to Otay Mesa Landfill or to a State licensed petroleum recycling facility. CECP representative will sign

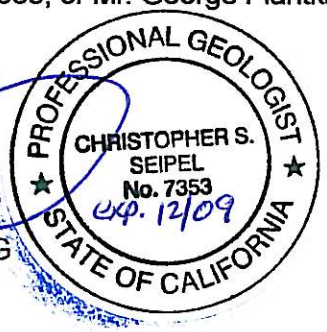
all manifests as generator. All subcontractors utilized for transportation and/or disposal will posses all applicable state and federal permits, certifications, and licenses that are required to legally perform the requested tasks.

**Community Health and Safety Plan**

A Community Health and Safety Plan (CHASP) will be prepared with the intent of public distribution to inform the adjacent communities where soils and other materials contaminated with hazardous substances are excavated, removed, or handled. The goal of the community Health and Safety Plan will be to identify and address potential environmental exposures hazards posed by the site remediation work. The CHASP will address all the requirements of a CHASP as defined in the SAM guidance Section 4, IV.

CECP will notify the SDDEH when tank demolition work begins and will notify SDDEH four weeks prior to mobilization for soil removal. CECP and SGI look forward to working with SDDEH in order to make it a safe and successful project. If you have any questions, please do not hesitate to call either myself at (562) 597-1055, or Mr. George Piantka at (760) 710-2156.

Sincerely,




C. Scott Seipel, P. G., CHG
Senior Hydrogeologist

Enclosures: Figure 1- Site Location Map
Figure 2 – Verification Sampling Plan
Table 1 – Tank Summary
Table 2 – Cleanup Goal
Table 3 – Cleanup Goal
Table 4 - Verification Sampling And Analysis Plan

cc: Mr. Marc Kodis, NRG
Mr. George Piantka, NRG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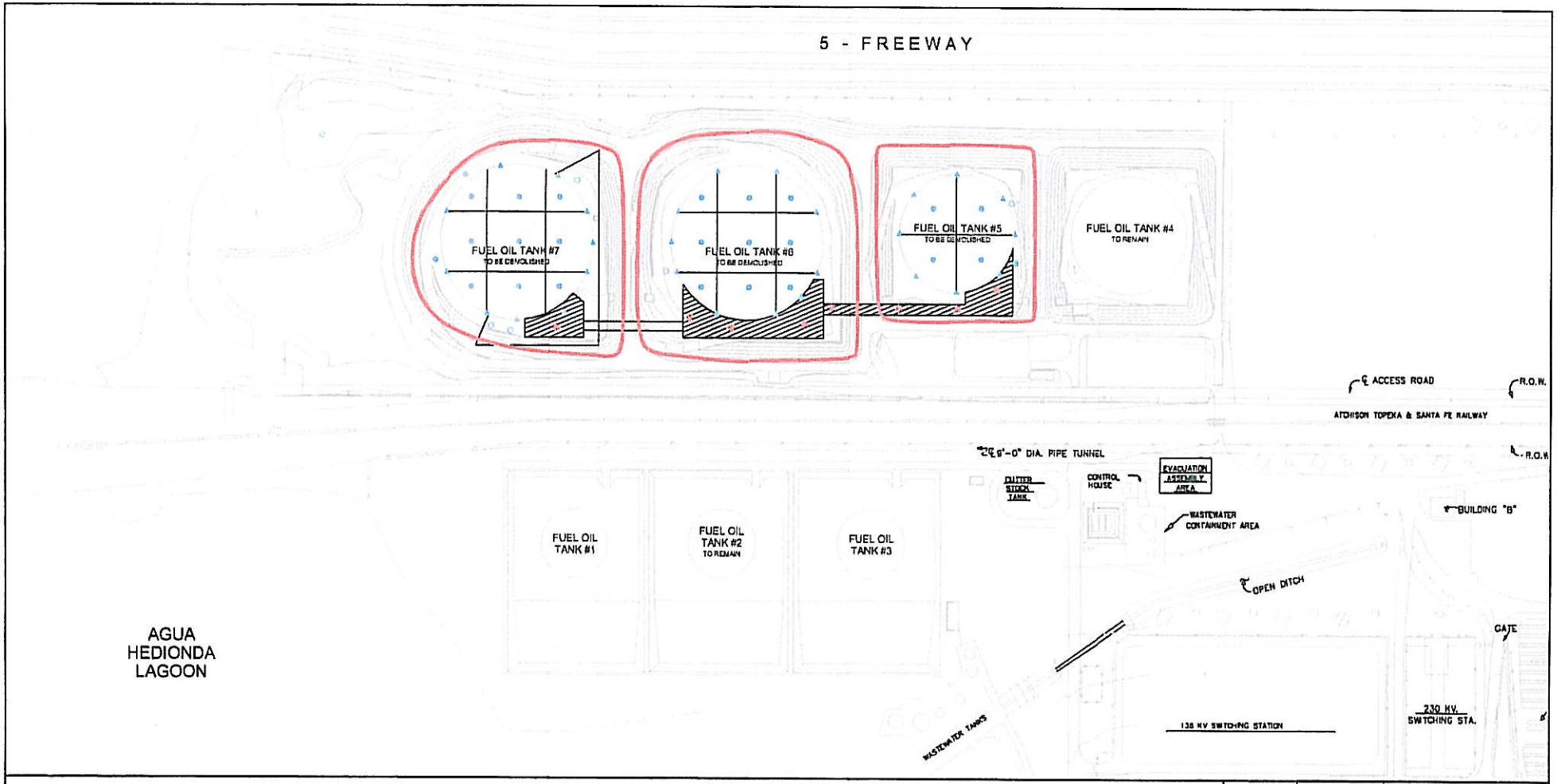
TOPOGRAPHIC QUADRANGLE MAP
SAN LUIS REY, CA

# SITE LOCATION MAP

CARLSBAD ENERGY CENTER PROJECT
ENCINA TANK FARM
4600 CARLSBAD BOULEVARD
CARLSBAD, CALIFORNIA

FIGURE

1




**LEGEND**

- SUBJECT TANK AREAS
- PIPING AND ANCILLARY EQUIPMENT CURIDOR
- PREVIOUS ASSESSMENT LOCATION SOIL BORINGS
- PROPOSED EXCAVATION BOTTOM SAMPLE LOCATIONS
- PIPELINE CORRIDOR SAMPLE LOCATIONS
- PROPOSED VERIFICATION LOCATIONS

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# VERIFICATION SAMPLING PLAN

## CARLSBAD ENERGY CENTER PROJECT
## ENCINA TANK FARM PLAN

4600 CARLSBAD BOULEVARD
CARLSBAD, CALIFORNIA

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FIGURE 2

**TABLE 1**
**TANK SUMMARY**
**CARLSBAD ENERGY CENTER PROJECT**
**TANKS 5, 6, and 7**
**Carlsbad, California**

| East Tank Farm | Year Constructed | Dimensions | Capacity | Contained | Anticipated Removal Quantities |
|---|---|---|---|---|---|
| **Tank 5** | 1971 | 240-foot diameter and a 32-foot height | nominal net capacity of 250,000 bbls | No.6 fuel oil | 1,654 cubic yards |
| **Tank 6** | 1973 | 315-foot diameter and a 32-foot height | nominal net capacity of 445,000 bbls | No.6 fuel oil | 2,850 cubic yards |
| **Tank 7** | 1977 | 315-foot diameter and a 32-foot height | nominal net capacity of 445,000 bbls | No.6 fuel oil | 2,908 cubic yards |

Notes: bbls = Barrels

TABLE 2
SOIL REMEDIATION GOALS FOR PETROLEUM HYDROCARBONS
CARLSBAD ENERGY CENTER PROJECT
4600 CARLSBAD BOULEVARD, CALIFORNIA

| | Soil Type and Grain Size in Millimeters | | | | | | |
|---|---|---|---|---|---|---|---|
| | Gravel | Sandy Gravel | Coarse Sand | Fine Sand | Silty Sand | Silt | Clay |
| | 76.2-4.75 | Based on % fines | 4.75-0.425 | 0.425-0.074 | Based on % fines | 0.074-0.005 | <0.005 |
| Gasoline/Naphtha Based Fuels | 560 | 1,500 | 2,300 | 2,900 | 5,600 | 19,000 | 44,000 |
| Kerosene / Jet Fuel No. 4 Fuels | 780 | 2,100 | 3,200 | 4,000 | 7,800 | 27,000 | 61,000 |
| **Diesel No. 2 Fuel[1]** | **1,000** | **2,800** | **4,400** | **5,400** | **10,000** | **36,000** | **82,000** |
| Fuel Oil | 1,400 | 3,800 | 5,900 | 7,300 | 14,000 | 49,000 | 110,000 |

Note: [1] Most likely case for the subject site considering Diesel Fuel No.2 and Fuel Oil No. 6 are the most prevalent contaminants on site.
Based on Table 5-8 from SAM Manual, Section 5.

TABLE 3
SOIL REMEDIATION GOALS FOR
VOLATILE ORGANIC COMPOUNDS, NAPHTHALENE, POLYNUCLEAR AROMATICS
CARLSBAD ENERGY CENTER PROJECT
4600 CARLSBAD, CALIFORNIA

| Constituent | Concentration In Parts Per Million |
|---|---|
| Benzene | 0.4 |
| Toluene | 5 |
| Ethylbenzene | 0.43 |
| Xylenes | 10 |
| Naphthalene | 2.35 |
| Polynulclear Aromatic Hydrocarbons | 0.3 |

Note: (1) Concentrations are a 1 to 1 conversion from the San Diego Regional Water Quality Control Board's UST Interim Guidance Memorandum on Low-Risk Fuel Contaminated Sites, Dated April 1, 1996, for low-risk groundwater sites within 1,000 feet of marine surface waters.

**TABLE 4**
**VERIFICATION SAMPLING AND ANALYSIS PLAN**
**CARLSBAD ENERGY CENTER PROJECT**
**TANKS 5, 6, and 7**
**Carlsbad, California**

| Area | Sample Interval | Estimated Number of Sample Locations [5] | Soil Analysis[6] | | | |
|---|---|---|---|---|---|---|
| | | | Total Petroleum Hydrocarbons (TPH) Full Scan (C4-C32) | Polynuclear Aromatic Hydrocarbons (PAHs) | Metals | pH |
| | | | EPA 8015B or DHS-TPH Method | EPA 8310 or 8270C | EPA 6010B/7471A | EPA Method 9045 |
| Tank 5 Bottom [1] | 1 Per 100' x 100' Grid | 4 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 5 Excavation Sidewalls | 1 Per 100' Linear | 8 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 5 Piping | 1 Per 100' Linear | 3 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 6 Bottom [2] | 1 Per 100' x 100' Grid | 9 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 6 Excavation Sidewalls | 1 Per 100' Linear | 10 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 6 Piping | 1 Per 100' Linear | 4 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 7 Bottom [2] | 1 Per 100' x 100' Grid | 9 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 7 Excavation Sidewalls | 1 Per 100' Linear | 10 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |
| Tank 7 Piping | 1 Per 100' Linear | 1 | All Samples | Hold for TPH results[7] | 10 Percent - Representative | 10 Percent - Representative |

Note: [1] Tank bottom 45,238 square feet
[2] Tank bottom 311,724 square feet
[4] Secondary analysis performed on any sample with total TPH above 100 mg/kg.
[5] Quality Assurance/Quality Control Samples will be collected at a rate of 10 percent of the total samples per day, at a minimum of 1 sample per day, or 1 sample per area.
[6] Hold times will be based on EPA SW-846 guidance.
[7] All sample locations will be sampled for SVOCs and a Hold will be placed on the samples until results of TPH analysis confirm presences of hydrocarbons. Samples showing TPH results above the proposed cleanup goal will then request SVOC analysis.